beach replenishment projects are generally undertaken only by local, state and federal governments.

Studies are currently underway in San Diego County that will address the potential impact of offshore movement of sand used to enhance existing beaches. Recent studies on the benefits of beach enhancement have indicated that they should be combined with hard structures in the form of sand retention groins. Groin fields should be constructed so as to create what may amount to a series of pocket beaches. Continued maintenance of these pocket areas would be required in order to preclude the normal loss of sand between the groins, which will naturally occur over the long term. These artificially constructed pocket beaches will act like natural pocket beaches, protecting the backshore from all but the most severe winter storm wave actions. Such a system can limit the continued erosion and retreat of either existing bluffs or, in the case of dune areas, the foredunes.

Land Use Planning

An additional approach to beach erosion issues includes the development of policies and regulations regarding the use of the shoreline and its development such as building setbacks on bluff tops, changes to local zoning that restricts certain private development, and control of surface water drainage.

It appears that there are very few alternatives available to public entities for solving erosion problems. Public entities can either allow armoring of eroding bluffs and shorelines, fund soft-structure beach enhancement to protect eroding shorelines or, provide for the normal retreat of the shoreline. This last alternative would require some significant changes in the policies of both local and state governments: 1) restrict development in eroding coastal areas, 2) where existing improvements are located in eroding areas, require relocation of facilities, both public and private, to allow for the natural retreat of the coastline.

OTHER FEDERAL, STATE AND LOCAL GOVERNMENTS

The following is a discussion of the primary federal, state and local government agencies that have authority to regulate and permit protective structures and beach enhancement projects. For purposes of this report, the local government discussion is primarily focused on San Diego County.

U.S. Army Corps of Engineers

Section 10 of the Rivers and Harbors Act authorizes the Corps to regulate all activities that affect the course, capacity, or coordination of navigable waters of the United States.

Congress has authorized federal participation in shore protection projects to prevent or reduce damage caused by wind and tide generated waves along the nation's coasts and shores. One requirement for federal participation is that benefits must exceed costs. The Corps can participate in shore protection plans that result in recreation benefits only if those benefits are incidental to storm damage reduction features and not the primary goal. Since the passage of the Water Resources Development Act of 1986, feasibility studies must be cost-shared evenly between the federal government and the local sponsor.[9]

One such effort proposed for northern San Diego County is a $3 million, three-year study of shoreline erosion in Encinitas and Solana Beach. The study will examine several options to fight erosion, such as supplying beaches with sand dredged from the mouth of San Elijo Lagoon to keep the inlet open to the ocean, or building breakwaters to keep beach sand from washing away. Other possibilities include buying bluff top properties and allowing a natural retreat of the bluffs, or increase bluff stability by using seawalls.[10]

The Corps has been very reluctant to deny permits for protective structures where there is a continuing possibility for damage or loss of improved upland properties.

CALIFORNIA STATE RESOURCES AGENCY

A committee of representatives from various Resources Agency departments and the CSLC is in the process of revising the State Policy on Shoreline Erosion Protection. The current policy has been in place since 1978, and major changes have occurred along the coast of California, not the least of which

has been the dramatic increase in population. The committee is arranging public workshops that will be conducted at various locations along the coast in the near future to seek public input to the process of preparing a revised policy. The title of the proposed new revised policy is "Policy on Coastal Erosion Planning and Response".

California Coastal Commission

The California Coastal Act permits the construction of protective structures when required to protect existing development for improved areas that are in imminent danger. Section 30235 of the Coastal Act states, in part:

> "Revetments, breakwaters, groins, harbor channels, seawalls, cliff retaining walls, and other such construction that alters natural shoreline processes shall be permitted when required to serve coastal-dependent uses or to protect existing structures or public beaches in danger from erosion, and when designed to eliminate or mitigate adverse impacts on local shoreline sand supply ... "(emphasis added)
>
> Section 30253 of the Coastal Act states, in part:
> "New development shall:
> (1) Minimize risks to life and property in areas of high geologic, flood, and fire hazard.
> (2) Assure stability and structural integrity, and neither create nor contribute significantly to erosion, geologic instability, or destruction of the site or surrounding area or in any way require the construction of protective devices that would substantially alter natural landforms along bluffs and cliffs. ..."

In approving new development in coastal areas, the California Coastal Commission (CCC) has included permit conditions that prohibit protective structures for new development, thus requiring applicants to design their development so that there should be no future necessity for a protective structure. On bluff top development this may include sufficient setback from eroding bluff tops. However, the CCC has been under recent pressure to allow protective structures for any improved property, regardless of whether or not there is a restriction in the original coastal development permit that prohibits such structures. The CCC may be facing litigation from private property owners seeking to protect their property challenging the CCC's right to prohibit protective structures.

To address the impacts of protective structures on shoreline processes in San Diego County, the CCC has developed an in-lieu fee program to provide mitigation for the quantifiable effects of seawalls on the shoreline. The methodology estimates the total quantity of sand necessary to replace: a) the reduction in the beach quality material contributed from the seacliff over the life of the armoring; b) the reduction in beach width which will occur when the landward migration of the beach profile is stopped, over the life of the structure; and c) the reduction in beach area which will occur from the seaward encroachment of the seawall. The methodology uses site specific information provided by the seawall applicant as well as estimates, derived from region-specific criteria, of both the loss of beach material and beach area which could occur over the life of the structure, and of the cost to purchase an equivalent amount of beach quality material and to deliver this material to the beaches in the project vicinity. Once the effects are quantified and the costs totaled, an in lieu fee is paid for beach sand replenishment projects as mitigation for impacts of the development on beach sand supply.

The applicant deposits the fee in an interest bearing account designated by the CCC's Executive Director. The CCC is named as trustee of the account, with all interest earned payable to the account to be used for establishment of a beach sand replenishment fund to aid the San Diego Association of Governments (SANDAG), or a CCC approved alternate entity, in the restoration of the beaches in San Diego County.

In the case of seacave fills, the CCC has not applied the in-lieu mitigation fee. Because the fills are intended to be located completely within the bluff, the accelerated erosion from increased wave reflection and "edge effects" to adjacent properties associated with seawalls should not occur. The

CCC requires the applicant to monitor the performance of the seacave fill. The report(s) are to contain recommendations for necessary maintenance, repair, changes or modifications. If the seacave fills are found to extend seaward of the face of the natural bluff by more than six inches in any one location, the report is to include alternatives and recommendations to remove or otherwise remedy this condition such that no seaward extension of the plug will remain.[11]

California Department of Boating and Waterways - Beach Erosion Control

Objectives of the program are to preserve and protect the California shoreline, minimize economic losses caused by beach erosion and maintain urgently needed recreational beach areas. In 1998, California's beaches generated $14 billion of direct revenue (lodging, food, gas, parking, etc.). Sections 65 through 67.3 of the Harbors and Navigation Code authorize the Department to study erosion problems; act as shore protection advisor to agencies of government; and plan, design and construct protective works when funds are provided by the Legislature. The Rivers and Harbors Act of 1962, as amended, allows the Department to participate in beach erosion control projects undertaken by the U.S. Army Corps of Engineers.[12]

In the last two years, the California Department of Boating and Waterways has received funding from the California Legislature to implement sand replenishment projects on a statewide basis (Ch. 798, Statutes of 1999). Ten million dollars was allocated for fiscal year 2001-2002 for grants to local governments for beach enhancement projects. Ongoing efforts stressing the importance of maintaining California's beaches will be necessary in order to continue the funding in years to come.

LOCAL GOVERNMENT

Hard structures and beach replenishment have generally been the popular methods used by local governments to assure protection of existing public and private facilities. Very little effort, at the local level has been shown in restricting development in coastal areas. The development of policies and regulations regarding the use of the shoreline and its development such as building setbacks on bluff tops are typically addressed in Local Coastal Programs mandated by the Coastal Act. However, only a limited number of jurisdictions require mitigation for building within or on an eroding coastline in the form of sand mitigation fees.

In San Diego County, several cities have existing ordinances or are proposing amendments to their General Plans/Local Coastal Programs to address the issues of shoreline and bluff protection. Through enactment of these various ordinances/general plan amendments, these cities are attempting to balance the rights of private property owners with the rights of the public. The approval of protective structures is generally conditioned to provide for minimal beach encroachment, protection of the environment and maintenance of public access. A summary of how some cities have addressed coastal protection within their jurisdiction is contained in Appendix A.

INTERAGENCY AND SCIENTIFIC ORGANIZATIONS

There are a number of associations, committees and groups that are currently studying coastal erosion issues and potential solutions.

California Shore and Beach Preservation Association

The California Shore and Beach Preservation Association (CSBPA) is the state chapter of the American Shore and Beach Preservation Association (ASBPA). The CSPBA is an educational and professional association with members from government, academics, coastal engineering and other professions, as well as property owners and individuals and groups interested in the protection, proper utilization, economic development and preservation of the coast of California. They act as a forum for presenting various scientific studies and reports dealing with coastal issues and coastal processes. CSLC staff has attended numerous conferences of this organization.

Coastal Sediment Management Work Group

The Resources Agency's Coastal Sediment Management Work Group was established by the U. S. Army Corps of Engineers and the California Resources Agency to facilitate regional approaches to protecting, enhancing and restoring California's coastal beaches and watersheds through federal, state and local cooperative efforts.[13] At the present time, it is composed of representatives from the Corps, Resources Agency, Department of Boating and Waterways, the California Coastal Commission, the California Department of Parks and Recreation, the CSLC, and the State Coastal Conservancy. The California Coastal Coalition, a non-profit organization comprised of cities, counties and regional government agencies along the coast provides the group with local perspective.

Los Angeles County Beach Replenishment Task Force

The Los Angeles County Beach Replenishment Task Force was created by the Board of Supervisors on July 21, 1998. The Task Force is composed of representatives of elected officials, various federal, state and local governments, and public interest groups. Its focus is, in part, to inventory the condition of county beaches; identify funding sources to accomplish beach restoration; formulate a long-term maintenance plan with assigned jurisdictional responsibilities.[14] The CSLC is a member agency of the task force.

San Diego Association of Governments

The San Diego Association of Governments (SANDAG) is composed of various local government agencies to assure overall area-wide planning and coordination for the San Diego region. By Resolution dated July 23, 1993, the SANDAG adopted the Shoreline Preservation Strategy for the San Diego region.

The Strategy has four main objectives:

1. Manage the region's shoreline to provide environmental quality, recreation and property protection.
2. Develop and carry out a cost-effective combination of shoreline management tactics that will have a positive impact on the region's economy.
3. Develop a program to pay for the shoreline management strategy that equitably allocates costs throughout the region, and among local, state and federal sources.
4. Obtain commitments to implement and finance the Shoreline Management Strategy.

The Strategy recommends a beach building and maintenance program for each of the region's shoreline problem areas. These programs emphasize the nourishment of narrow beaches with sand to make them wide enough to provide property protection and recreational capacity. The design of each beach building and maintenance program should consider a full range of shoreline management tactics that can support beach widening and make it more cost effective, including shoreline stabilization, shoreline protection, and shoreline development regulation.[15]

In furtherance of this strategy, SANDAG is in the final stages of acquiring permits for a county-wide beach replenishment project involving the placement of approximately two million cubic yards of sand at eight receiver sites. The CSLC has jurisdiction over both the offshore borrow sites and the receiver sites and, at its meeting of November 27, 2000, authorized the issuance of a Public Agency Lease for this beach replenishment project. This project is the first comprehensive, region-wide beach replenishment effort on the West Coast.[16] CSLC staff serves on the Technical Advisory Panel of SANDAG's Shoreline Preservation Committee.

Beach Erosion Authority for Clean Oceans and Nourishment

The Beach Erosion Authority for Clean Oceans and Nourishment (BEACON) is a joint powers agency composed of the counties of Santa Barbara and Ventura and the cities of Port Hueneme, Oxnard, San Buenaventura, Carpinteria and Santa Barbara, established to address coastal erosion and beach issues on the Central Coast. CSLC staff monitors and occasionally attends BEACON meetings.

ROLE OF THE CALIFORNIA STATE LANDS COMMISSION

Public Resources Code section 6301 gives the CSLC jurisdiction over all ungranted tidelands and submerged lands. Public Resources Code section 6321 states in part that "The commission, may upon written application of the littoral owner, grant authority to any such owner to construct, alter or maintain, groins, jetties, sea walls, breakwaters, and bulkheads, or any one or more such structures ... if, at the time of construction ... such structures do not unreasonably interfere with the uses and purposes reserved to the people of the State. ..."

Public Resources Code section 6321.2 states that "In addition to the fees provided in section 6321, the commission may fix and collect reasonable charges or rentals for the use of lands upon which any of the structures authorized under 6321 are situated." The CSLC's regulations as contained in California Code of Regulations, Title 2, Article 2, Section 2003 Rental (4) General Permits provides for rent to be based upon nine percent of appraised value. Section 2003 (4) (B) provides that the CSLC may waive rent for protective structures if it determines that a public benefit accrues from the installation of such structures.

In addition to the sovereign lands directly managed by the CSLC, the Commission has a general oversight responsibility for tide and submerged lands legislatively granted in trust to local jurisdictions. Most of the urban waterfront areas in California are granted to local jurisdictions. These grantees assume the day-to-day management and permitting responsibilities to ensure that the uses of sovereign lands are consistent with the Public Trust and the legislative statutes under which these lands are held.

Commission data base records indicate that the CSLC has issued approximately 321 leases/permits for protective structures statewide. Eighty-eight of the leases/permits are for structures along the coast, the majority of which are located in southern California. The remainder are located on inland waterways or within bays (such as San Francisco). The 321 leases/permits by type of structure are as follows:

Seawalls - 69
Bank Protection (Riprap) - 206
Breakwaters - 15
Beach Enhancement Project - 31

The 88 leases/permits issued for coastal areas by type of structure are as follows:

Seawalls - 48
Bank Protection (Riprap) - 22
Breakwaters - 6 (primarily to public agencies)
Beach Enhancement Projects -12

It should be noted that these numbers were taken from the existing Lease Data Base and do not necessarily reflect the exact numbers of leases/permits that have or may have been issued by the CSLC or its predecessor offices of the Surveyor General and Division of State Lands.

Boundary Consideration

Along most of California's coastline there is uncertainty as to the exact location of the boundary that separates upland ownership from the Public Trust lands of the state. Only 1±% of the state's sovereign land boundary have been permanently fixed by adjudication or agreement. The shoreward boundary of the state's ownership of the Pacific Ocean and adjacent bays and estuaries, as well as other tidal waterways within the state, is the Ordinary High Water Mark, adopted by statute in 1872 (Civil Code sections 670 and 830). The federal and state courts have interpreted this boundary to be the intersection of the elevation of mean high tide and the shore (approximately two feet ± above sea level). Because sandy and even cobble beaches are subject to erosion and accretion the location of this intersection (i.e. the boundary) is in a constant state of flux. Some sandy beaches in California have been known to erode away and accrete back nearly 100 feet on an annual basis.

The law of moving boundaries along waterways often leads to conflict and confusion relating to ownership and jurisdiction issues. This is particularly true when people are unaware of either the physical dynamics of the shoreline or the law that seeks to reflect that dynamic. What one day is public land, the next may be private and vice versa. The dynamics may also create difficulty in determining the need for a lease from the CSLC. The costs associated with determining the boundary between uplands and sovereign lands at any given location may reach thousands of dollars. In addition, the length of time to make such a determination could range from several months to years. This can be a substantial burden for private citizens or public entities, including the CSLC, seeking a determination of that boundary. There is even an exception to the mean high tide line and moving boundary line rule, where man made or caused changes interrupt the natural movement of the line. If the intersection of the mean high tide line moves seaward due to such artificial activities (fill or accretion caused by a groin are examples) the legal boundary remains at the location of the mean high tide line prior to those activities. Therefore the public does not lose title to its property caused by such artificial influences. This is particularly important because protective structures are designed to prevent erosion landward of their placement but sometimes cause erosion of beaches seaward of the toe of the structure. This result is often the basis for opposition to such structures by public access advocates.

In certain instances, CSLC staff has reviewed projects where the location of the boundary is uncertain and the project is allowed to proceed forward without permit from the CSLC. Such projects are allowed to proceed with the caveat that if the boundary is established and shows the improvements to be located on sovereign lands, the private party will enter into a lease with the CSLC or remove the structure occupying state lands. Where a proposed project has the potential for a significant negative impact on the public's property rights, it is important that CSLC staff resources be directed to analyze the boundary issue.

Public Benefit

The current application of public benefit consideration to justify rent-free protective structure leases stems from inland waterways where the Corps of Engineers, Reclamation Districts or property owners along the banks of rivers and streams, sought authority to protect river levees from erosion and prevent flooding of adjacent lands. For at least the last two decades, the CSLC and its staff have determined that although the protective structures, normally rock riprap bank protection, did have a direct benefit to the adjoining property owner, they also had an indirect benefit of providing protection for public roads, highways and utilities, and to the public waterways which serve to transport freshwater to federal and state water projects. An additional benefit was the reduction of the depositing of materials into navigable channels that ultimately needed to be removed at public expense. There were active programs administered by the Corps of Engineers to dredge waterways to provide navigable channels for commercial and public navigation. The cost of conducting these dredging activities was borne by the public in general, through federal taxes that paid for federal navigation projects. Therefore, staff was able to show a direct connection between the placement of the riprap and the public benefit derived, i.e. lowering the needed and costly process of dredging navigable channels and, in addition to that, providing additional protection to public infrastructure in the form of flood control levees without additional public cost.

In coastal areas other arguments provide support for rent-free public benefit leases. Protective structures, particularly in areas open to the public, protect the base of eroding coastal bluffs, and provide a measure of safety to the public by reducing the potential of bluff collapse. Last year, a bluff failure in northern San Diego County resulted in the death of a beach-goer. Such catastrophic failures can occur without warning and present a hazard to the beach going public. This type of hazard can be partially limited through the construction of protective structures along the base of bluffs that are subject to undercutting.

The CSLC has also taken the position that a public benefit was derived in protecting critical and high value public infrastructure located in close proximity to the edge of coastal bluffs such as major public roads, sidewalks, water, sewer, power and gas facilities. Some of the lower coastal bluffs areas in Malibu and along north coast San Diego and Orange counties have major roads either along the

beach or in close proximity to eroding bluffs which require protection. In the city of Pacifica in San Mateo County, several oceanfront homes and public infrastructure were threatened and/or destroyed during the El Niño storms of 1998. The Federal Emergency Management Agency (FEMA) and the State Office of Emergency Services approved a $1.5 million grant to the city to construct a protective structure at the base of the bluffs, with the understanding that the bluff top homeowners would agree to maintain the protective structure. The city applied to FEMA for a grant to purchase ten upland properties from the homeowners through FEMA's Hazard Mitigation Grant Program. That grant money, along with additional grant money received from HUD, enabled the city to offer the homeowners 90% of the fair market value of their homes. The city is in the final stages of closing escrow on the ten properties. The lots will permanently be dedicated as open space.[17]

If private property owners are not allowed to build protective structures to protect their private property, then ultimately and eventually governmental entities may be required to do so to protect the public infrastructure that would be placed at risk if the coastal bluffs are allowed to erode unheeded. As an example, portions of Pacific Coast Highway in Malibu that are adjacent to the Pacific Ocean and are not sheltered by existing residential developments, must continually be protected by Cal Trans at public expense.

Rent Consideration

As stated earlier, a consideration as to when and whether the CSLC should charge rent at a particular location is the frequent uncertainty and difficulty in locating the boundary that separates public and private property (i.e. the CSLC's jurisdiction for leasing). Where there is evidence that a protective structure will occupy lands under the CSLC's jurisdiction, staff has recommended that a protective structure lease be issued. In many cases the reason that the private party enters into a lease with the CSLC for such structures is to expedite the protection of their private property. These leases are generally non-prejudicial with respect to the actual location of the boundary. Given the high land values of coastal properties in Southern California and the CSLC's existing regulations, typical annual rents could range from $1,000 - $4,000, or more. Some private parties may choose to challenge the CSLC's jurisdiction rather than pay rent for property they believe they own. The costs of litigation can be extremely high, with both the state and the private property owners bearing the burden. Some private parties may choose to litigate at any cost. Several years ago the CSLC was sued in a quiet title action over the boundary between uplands and sovereign lands near Las Tunas in Malibu and the property owner was ordered by the Court to remove the portion of his existing house from state owned lands. The CSLC's most recent legal dispute involving a boundary is the ongoing Lechuza case that has been in the courts for over five years, including two trips to the Court of Appeal. Because of the difficulties of proving ownership and the cost of defending ownership claims, staff has continued its practice of providing protective structure leases to private parties without requiring annual rent.

Beach replenishment projects have an obvious two-fold benefit for the public in that they provide significant protection from the effects of coastal erosion on inland properties, as well as enhancing sand-starved beach areas. Enhanced beaches benefit the state tourist industry and are of significant importance to the overall economic health of California. Therefore, waiver of monetary consideration by the CSLC for this type of project is warranted.

If rent is to be assessed for use of sovereign lands, the CSLC's regulations establish the methods by which rent is calculated. As previously stated the CSLC's regulations provide that rent is to be based on nine percent of appraised value, but the CSLC has the discretion to waive rent for protective structure leases issued to private parties and public agencies when it is determined that a public benefit accrues from the installation of such structures.[18] It has been the practice of the CSLC over the last 15± years to waive rent for protective structures based on such public benefit.

For purposes of this report, CSLC staff conducted a limited review of the land values in the north coast San Diego area and the Malibu area of Los Angeles County to establish a basis for setting rents for protective structures. Land values in the coastal area of northern San Diego County for typical oceanfront residential lots (50 feet wide) range between $110 - $150 per square foot. In the Malibu area of Los Angeles, land values for typical oceanfront residential lots (40 feet wide) range from $250 to $300

per square foot. Based on the CSLC's regulations that require rent to be based on nine percent of the appraised value for the use of state sovereign lands, the rent could range between $10 to $13.50 per square foot in San Diego County, and from $22.50 to $27.00 per square foot in Malibu. Assuming that a seawall might extend four feet out onto state sovereign land, typical average annual rents could range from $2,000 to $4,000, or more, depending on location. As these rent amounts indicate, the cost to an upland property owner for a protective structure adjoining their property that extends out onto state sovereign lands could be more than nominal.

Mitigation

When CSLC staff is reviewing proposed protective structure projects that have the potential to encroach on or impact sovereign lands, it is necessary to determine if the location of the boundary between public and private property has been established. In 1993, the staffs of the CSLC and the CCC implemented a process that requires applicants for coastal development permits to obtain a written jurisdictional determination from the CSLC as a component of an application to the CCC. This coordination has enabled both agencies to closely examine potential impacts of proposed development projects on a case by case basis. If the location of the boundary has been established, then the CSLC may impose mitigation requirements as conditions of a protective structure lease. However, generally the CSLC relies on the regulatory authority of the CCC to impose mitigation in the form of public access dedications and, in some instances, monetary compensation to be used to fund beach replenishment projects. Because of the cost and length of time to determine the state's boundary at any given location, this coordination with the CCC, other regulatory agencies, and local governments is the primary method of ensuring that potential impacts to sovereign lands are adequately mitigated.

CONCLUSIONS

The causes of loss of shoreline to public use are many; one of the primary ones being shoreline erosion. Hard, shoreline protective devices can create additional impacts by physically occupying a beach and by altering shoreline processes. Beach replenishment projects have the advantage of improving the size of the beach but are expensive and must be repeated periodically to maintain the desired beach width. Beach replenishment is not a practical remedy for individual property owners because it must occur on a large scale. Other potential solutions to erosion include requiring that sand now trapped behind dams to be transported to the shoreline and adopting development siting regulations to maintain a safe setback from the ocean.

The CSLC is involved with erosion and shoreline protection because it is responsible for managing public lands below the mean high tide line for the benefit of the public. Proponents of shoreline protective devices on ungranted state tidelands must obtain a lease from the CSLC. It is obligated by the public trust doctrine and other law to review these projects for their impact on the environment, recreation and other public uses of the land.

The CSLC's jurisdiction over shoreline protection is limited for several reasons. First, many shoreline protective devices are not on property subject to its review because they are located above the mean high tide line. Further, this line changes continually and is very difficult to identify. Charging rent and mandating mitigation is legally problematic when public ownership of the site of the shoreline protective device is uncertain. California law also favors rent-free leases of state lands for shoreline protection where there is some public benefit. The CSLC does not have jurisdiction over those tidelands granted to local governments. Finally, the CSLC has difficulty addressing the primary cause of shoreline erosion - loss of sand to dams – because these facilities are generally constructed in river locations beyond the extent of the CSLC's jurisdiction. As a result of these limitations, the CSLC alone cannot comprehensively address the issues of shoreline erosion and the effects of shoreline protection.

Because the causes and solutions are complex, many local, state and federal agencies are working on problems associated with shoreline erosion. Some of these are conducting research, others fund and carry out large-scale projects and others regulate development and shoreline protective devices. The agency with the most comprehensive regulatory authority over shoreline protection along the coast is the CCC. Unlike the CSLC, it has the authority to uniformly regulate projects on either side of the mean high tide line and on ungranted tidelands. It has used this authority to establish meaningful mitigation and design review requirements for shoreline protection projects.

The CSLC actively utilizes the authority it has to address shoreline erosion. It reviews every application for shoreline protection submitted to the CCC. It advises the CCC when projects appear to be on public land and establishes setback lines which often are used, where feasible, to keep projects off public property. The CSLC provides its engineering expertise to the CCC and other agencies for the review of these projects. Staff of the CSLC actively participates in several interagency shoreline erosion working groups. The CSLC also accepts the public access easements often required by the CCC as mitigation for approval of shoreline protective devices.

The impact of shoreline erosion and shoreline protective devices on the public's tide and submerged lands is of utmost concern to the CSLC. To better protect the public's tidelands, it will continue to appropriately utilize its authority to review shoreline protection projects and to work with other public agencies on research, planning and regulation.

APPENDIX A

City of Carlsbad

The City of Carlsbad has established a Beach Erosion Committee comprised of seven citizens appointed by the Mayor with concurrence of the City Council. The committee investigates and reports on topics or studies related to beach and bluff erosion (including lagoons and jetties) as directed by the City Manager and City Council.

The City's Municipal Code includes a Coastal Shoreline Development Overlay Zone intended to provide land use regulations along the coastline area including the beaches, bluffs, and the land area immediately landward thereof. The purpose of the overlay zone is to provide for control over development and land use along the coastline so that the public's interest in maintaining the shoreline as a unique recreational and scenic resource, promoting public safety and access, and in avoiding the adverse geologic and economic effect of bluff erosion, is adequately protected."[19] The Overlay Zone provides for the construction of protective structures when necessary to protect coastal dependent uses, existing structures or public beaches in danger of erosion, and when designed to mitigate for the impacts on public access and sand supply (i.e. beach replenishment).

City of Encinitas

The City of Encinitas is in the process of completing a *Comprehensive Coastal Bluff and Shoreline Plan* addressing coastal bluff recession and shoreline erosion. The Plan takes a comprehensive look at the bluff and shoreline issues within the City of Encinitas and establishes goals, policies, standards and strategies that the city will pursue for the life of the General Plan. The Plan contains a section entitled "Shore Protection, Cobble Management and Bluff Protection" that includes policies addressing shore protection.

In 1994, after receiving numerous requests from individual property owners to construct seawalls along Neptune Avenue, the CSLC issued a Public Agency Lease to the City of Encinitas authorizing the City to enter into agreements to construct and maintain vertical seawalls beginning at the northerly limits of Encinitas down to the northerly limit of Moonlight State Beach, a distance of approximately one mile. Each individual project must, however, still be reviewed and approved by the CSLC.

City of Solana Beach

The City of Solana Beach adopted Ordinance No. 195 on June 6, 1994, amending the Municipal Code by the addition of Chapter 17.62, *Shoreline and Coastal Bluff Protection* that provides for the construction of seawalls, revetments, bluff retaining walls and other shoreline and coastal bluff protection measures. The ordinance provides a regulatory framework that protects vested private property rights and important public interests in shoreline resources that can be harmed by the construction of coastal bluff protection measures. The City is also in the process of updating its General Plan to include the addition of a Beach and Bluff Element to assist in the management of its shoreline and coastal bluff areas.

City of Del Mar

The City of Del Mar adopted an Initiative on April 12, 1988, establishing the Beach Overlay Zone (Chapter 30.50). The Initiative was established to regulate the uses of the Del Mar beach area. Chapter 30.50.060 addresses the circumstances under which protective structures may be authorized within the Beach Overlay Zone.

City of Oceanside

Ordinance No. 83-11 was adopted on April 13, 1983, amending the City Code by the addition of Chapter 19.B. This chapter established regulations for the construction of seawalls, revetments, and other protective structures. The ordinance was amended on May 8, 1985, pursuant to Ordinance No. 85-12, addressing permit requirements for repair and maintenance of protective structures.

City of Coronado

The City of Coronado adopted Ordinance 1532, Chapter 86.74 *Waterfront Development*, and Ordinance 1533, Chapter 86.76 *Protection of Natural Ocean and Bay Processes*. These ordinances address waterfront development and setbacks. Protective structures are permitted only to serve coastal dependent uses, protect existing structures, remove public hazards, or protect public beaches in danger of erosion.[20]

FOOTNOTES

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[3]Gary Griggs and Lauret Savoy, editors, *Living with the California Coast*, Duke University Press, 1985.

[4] *Ibid.*

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[6] Gary B. Griggs, *The Armoring of California's Coast,* California and the World Ocean '97 Conference Proceedings, March 24-27, 1997, American Society of Civil Engineers.

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[18] *California Code of Regulations*, Title 2, Article 2, § 2003.

[19]City of Carlsbad, *Ordinance NS-365*, § 22 (part) 1996.

[20] City of Coronado, *Chapter 86.74 Waterfront Development (Ordinance 1532), and Chapter 86.76 Protection of Natural Ocean and Bay Processes (Ordinance 1533).*

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GLOSSARY

Accretion: the gradual addition of material to pre-existing material, opposite of erosion

Beach: the area of unconsolidated material periodically covered and uncovered by ocean waters, from low water to line of vegetation

Benthic: located on the bottom of the sea

Breakwater: an offshore structure (as a wall) protecting a harbor or beach from the force of waves usually constructed of concrete or rock

Bulkhead: a retaining wall constructed of concrete, steel or wood that is backed with solid fill and erected along the water to extend the upland out to the bulkhead line; serves as protection against tidal or watercourse erosion of land and may also serve as a retaining wall, thereby allowing placement of structures near the water

Erosion: the wearing away of material by natural forces due to waves, currents or wind

Estuary: an area in which freshwater flows of a river mix with salt water of the ocean

Foredunes: area of sand mounds closest to the ocean and subject to wave action

Groin: a rigid structure of rock, concrete, steel, wood or combination of these materials, usually built out from a shore to protect the shore from erosion, to trap sand, or to direct a current for scouring a channel

Headlands: a point of land, typically of stable material extending into the ocean

Horizontal and vertical access: land capable of being used to traverse along the beach (horizontal) or get to the beach from an upland location (vertical)

Jetty: A structure of stones, piles, etc., that projects into a body of water to direct and confine a stream or tidal flow to a selected channel, often found at harbor entrances to preventing shoaling

Littoral drift: the movement of suspended material in the water along the shore, caused by waves and current

MHTL: Mean high tide line; the location of the intersection of the elevation of the arithmetical average of 19 years of measured high tides and the shore.

Offshore gradients: the slope or elevation of underwater lands

Pocket beaches: small beaches formed between two points or headlands

Revetment: a cement or rock facing used to support and protect an embankment, bluff or structure from wave attack and prevent erosion

Riprap: a foundation or wall of stones or rocks that are loosely placed together; usually constructed adjacent to areas subject to heavy wave action to prevent scour or erosion

Scour: removal of material by waves and currents, especially at the base or toe of a shoreline structure

Seacave: a concaved bluff area caused by the erosive forces of wave action

Seawall: a normally vertical solid wall, embankment or structure built along the coastline to protect the shore from erosion, wave action.

Shoreline: intersection of the ocean with land

Tide: The periodic rising and falling of the water that results from the gravitational attraction of the moon and sun acting upon the rotating earth. Horizontal movement of the water resulting from the same causes, although sometimes referred to as *tide,* should be called tidal current.

Turbidity: character of water containing sediment or particles causing cloudiness

Upland: land above the surface of a body of water